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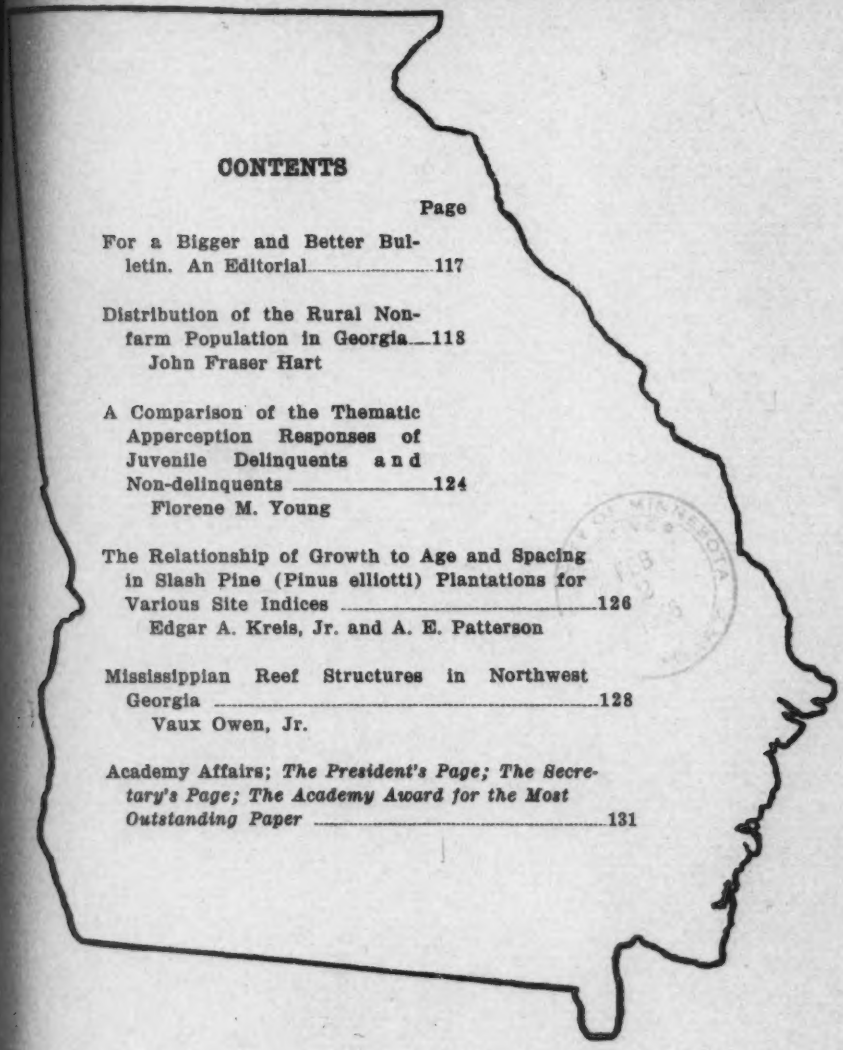

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BULLETIN OF
GEORGIA ACADEMY OF SCIENCE

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THE BULLETIN of the GEORGIA ACADEMY OF SCIENCE is published four times each year, in January, April, June and September and is sent without charge to all members of the Academy.

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FOR A BIGGER AND BETTER BULLETIN

An Editorial

It is not to be the policy of the editor to utilize the space of the Bulletin to set forth his personal ideas, gripes or problems. There is, however, a need on the part of the Bulletin for certain proposals to be brought to the attention of the members of the Academy and eventually to other scientists of the state.

In most worthwhile endeavors a period is reached when a decision must be made either to push forward and develop to the fullest extent or to maintain the *status quo* by continuing on the same level as in the past. It appears that such a period has been reached in the development of the Bulletin of the Georgia Academy of Science. Does the Academy want a publication that will rank with other outstanding journals of its class?

Despite the fact that the number of scientific publications has increased considerably in the last decade, and library shelves are being filled with printed volumes, and the pockets of scientists are being drained to pay for them, the need is not minimized for adequate space for publication of the results of important work that is being done. Granted that much of the material that is published is of little value one may not conclude that everything of value is published in some journal.

The number of scientists is increasing and will continue to increase as scientific progress is made. Due to the industrial progress being made in Georgia and the remainder of the Southeast a greater percentage of outstanding scientific workers will move into or remain in the section.

The Georgia Academy of Science is challenged to contribute to this march of scientific progress and one way of meeting this challenge is to provide adequate means and incentive for publishing the results of some of the work that is being done. The Bulletin of the Academy has been placed on a sound foundation. The library of the University of Georgia is custodian and the Gifts and Exchange Division distributes the exchanges to more than two hundred organizations and libraries in this and foreign countries. The Bulletin can be made an outstanding publication, and with the full support of the members of the Academy the editorial staff proposes to endeavor to attain this goal.

I certainly agree with Harry R. Skallerup (Science 121; 904-905) that it would be much more feasible, at least for the librarians, to have all articles relating to one field of science published in a few journals. It must be realized however, that most of the publications have a reserve of accepted papers for six to twelve months. There is every indication that this condition will become more acute. For this reason a non-member of an organization finds it almost impossible to obtain acceptance of a paper for publication in its journal.

Many highly technical papers had best be published in journals relating specifically to the particular field of interest. There is a place,

however, for publications of the type that almost of necessity must be utilized in periodicals of academies of science. Such publications have a more general coverage and are not limited to any one field. Advantages as well as disadvantages are innate in this type of publication. Some are mentioned but undoubtedly there are others.

1. It can be made to fulfill the needs of interrelation among the various fields of science.
2. This type of publication is most advantageous in the field of education.
3. Any field of science may be emphasized and indeed the emphasis may be shifted from one field to another as necessity demands.
4. An article dealing primarily with local interests though of outstanding quality is, because of its geographic localization, frequently not acceptable by journals published in other areas.

The editors of the Bulletin will welcome articles that may not be desired by journals published in other areas because they deal with local conditions. Such material will be given the same consideration as papers dealing with subjects of wider interest.

The objection has been raised that the Bulletin is not as well known and widely read as other publications and consequently few scientists will be willing to publish the results of their work in its pages. It is hoped that as the Bulletin increases in importance and becomes more widely known it will take its place with other outstanding scientific publications. The Georgia Academy of Science and the Southeast not only can support a worthwhile journal but also need means of conveying to others what their scientists are doing. The publication of outstanding articles within its pages will result in wider distribution of the Bulletin and help to place it in the hands of those for whom it is intended.

With your support the Bulletin can become a publication regarded with pride by every member of the Academy.

W. B. R.

THE DISTRIBUTION OF THE RURAL NONFARM POPULATION IN GEORGIA[1] [2]

JOHN FRASER HART
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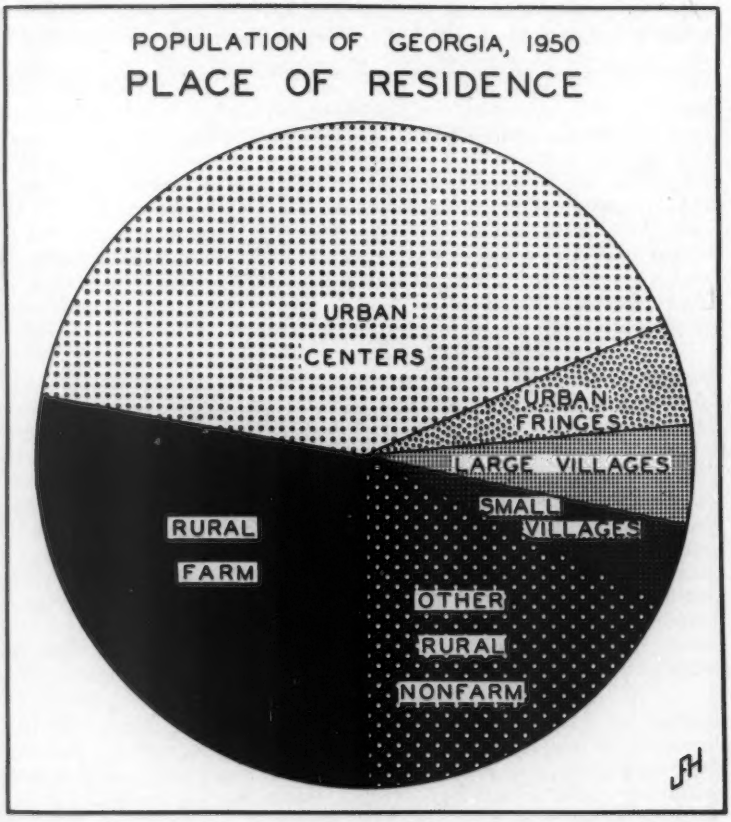
This paper is an analysis of the distribution of Georgia's rural nonfarm people, who comprised approximately one quarter of the state's population in 1950 (Fig. 1). The rural nonfarm category includes three groups: first, the eighteen per cent of Georgia's people

1. The research reported in this paper was financed by the General Research Budget of the University of Georgia, to which the author makes grateful acknowledgement.

2. This paper was presented as being the most outstanding paper read at the Athens meeting in the Earth Science Section, Section III.

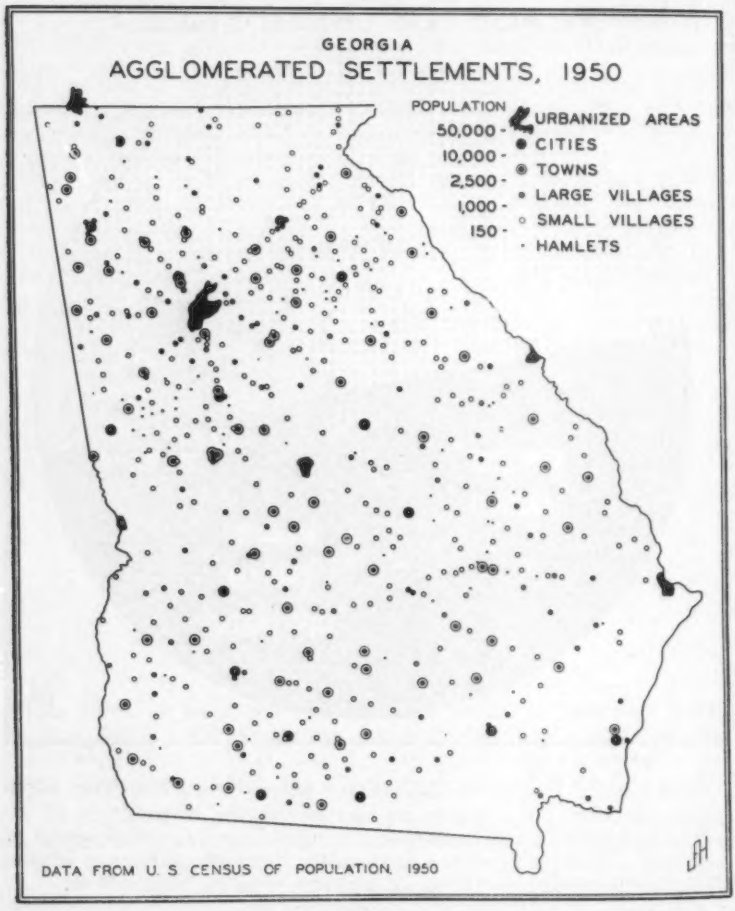
who live in *isolated houses* not on farms; second, the four per cent who live in incorporated *small villages and hamlets* of less than a thousand; and third, the five per cent who live in *large villages* of one to two and a half thousand persons. Although the five per cent of Georgians who live on the densely settled fringes of the state's five largest cities are specifically excluded it is evident that at least a third of the rural nonfarm people of Georgia actually live in agglomerated settlements of less than two and a half thousand persons. Be-



fore discussing the distribution of the isolated rural nonfarm population, therefore, it behooves us to consider the distribution of incorporated villages and hamlets in Georgia. Unincorporated places of less than a thousand persons are omitted from the following discussions, as the Census contains no separate data on such places.

Agglomerated settlements in Georgia are concentrated on the Pied-

mont and, to a lesser degree, on the Inner Coastal Plain (Fig. 2). There are relatively few agglomerated settlements in the Blue Ridge, along the Fall Zone, or on the outer Coastal Plain, despite the fact that the latter two areas contain some of the state's larger urban centers. Two special features of the distribution of agglomerated settlements merit brief attention. First, many of them are aligned along transportation routes, especially where road and rail are parallel, as from Toccoa via Atlanta to West Point, or from Savannah via Valdosta to Bainbridge and Donaldsonville. Second, although the hexagonal distribution of settlements hypothesized by Christaller is vaguely apparent in the more densely populated portions of the



state, it tends more toward the polygonal than the hexagonal, especially near Atlanta.

Agglomerated settlements of rural nonfarm people are here divided into three categories, namely, large villages of more than one but less than two and a half thousand; small villages with less than a thousand persons but more than a hundred and fifty; and hamlets, with less than a hundred and fifty persons.

At least a third of the large villages of Georgia are obviously suburban. Eighteen of the hundred and ten large villages in the state are mill villages or new residential developments which are contiguous to a larger town or city but which have not yet been annexed by it. The 1950 Census of Population does not recognize urban fringes for any city of less than fifty thousand persons, however, so the truly urban fringe population of these large villages is classified as rural nonfarm population. The second suburban group of large villages are strung along highways from three to eighteen miles beyond the urbanized area of Atlanta. Chickamauga and Ringgold have the same relation to Chattanooga, but similar large villages are not present around Georgia's other urbanized areas. The nonsuburban villages of Georgia are primarily trading centers in parts of the state where the agricultural and industrial population is not dense enough to support towns of twenty-five hundred people. Such villages are noticeably evident in the Blue Ridge, in the southwestern part of the Fall Zone, and on the outer Coastal Plain.

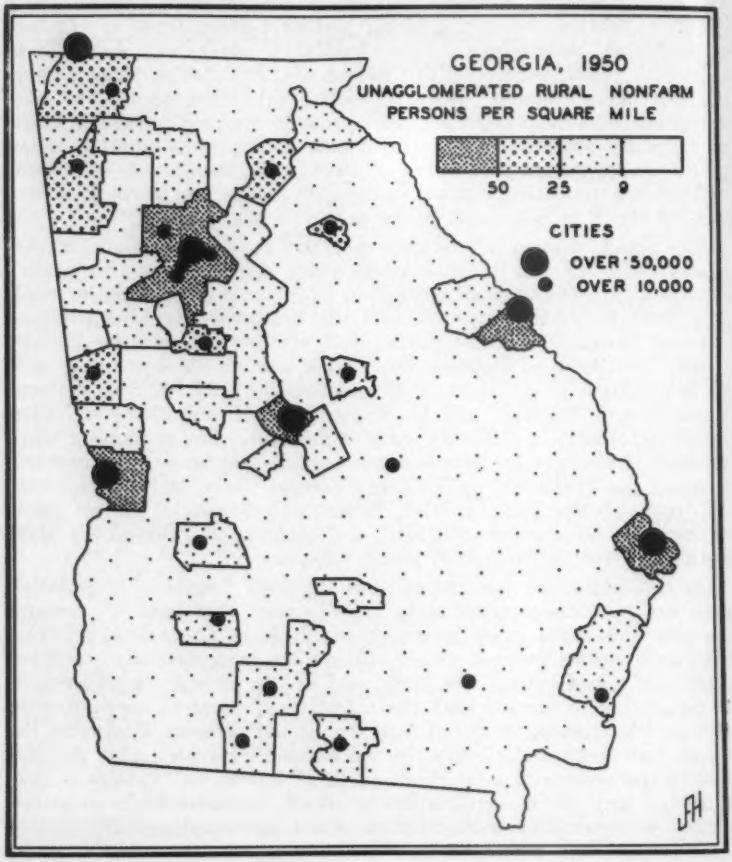
The small villages of Georgia are predominantly minor market centers, with marked lineation where roads and rail lines are parallel. Almost a fifth of the small villages in Georgia lie on four major road-rail lines: U. S. Highway 280 and the Seaboard Air Line Railroad between Savannah and Columbus; U. S. Highway 84 and the Atlantic Coast Line Railroad between Brunswick and the Alabama line west of Bainbridge; U. S. Highway 23 and the Southern Railroad between Cornelia and Atlanta; and U. S. Highway 41 and three rail lines which parallel it in different parts of the state. The remaining small villages of Georgia are relatively dispersed, with greatest concentrations on the Piedmont, on the Inner Coastal Plain, and in the southern part of the state around Tifton and Moultrie. In all parts of the state, however, short stretches of highway or railroad are highlighted by the alignment of small villages.

At this point, we must recall that the 1950 Census of Population does not tabulate separate data for places of less than a thousand persons unless the place is incorporated. It is apparent, therefore, that any unincorporated small villages are automatically excluded from our consideration. Similarly, and of far greater significance, it is reasonable to assume that the majority of hamlets are unincorporated. The concentration of hamlets in the western Piedmont between LaGrange and Griffin, in the eastern Piedmont near Athens, and in the eastern Coastal Plain north of Lyons and Vidalia is thus illusory. Any valid explanation of those concentrations must, of necessity, result from investigation of the historical-political factors

which have stimulated incorporation of very small settlements in these particular areas.

Thus far we have considered the distribution of Georgia's large villages, small villages, and hamlets. Now we shall examine the distribution of the rural nonfarm people who live in isolated houses not on farms. Let us tentatively refer to these people as the "unagglomerated rural nonfarm population."

Although these people apparently do not live in agglomerated settlements, they are extraordinarily concentrated (Fig. 3). Nine counties contain almost one third of the state's unagglomerated rural nonfarm population, and eighteen contain almost half of it. Each of the nine counties with more than forty such persons per square mile is closely associated with a city of more than fifty thousand. Six of the nine counties with more than twenty-five unagglomerated rural



nonfarm people per square mile are associated with cities of more than ten thousand persons. Two of the exceptions, Walker and Catoosa Counties, are within Chattanooga's orbit; the third, Polk County, has a city (Cedartown) which falls only five hundred and thirty persons short of ten thousand.

It is evident that the greatest densities of unagglomerated rural nonfarm population are found near urban centers; conversely, sixteen of Georgia's twenty-four cities of more than ten thousand persons are in counties with more than twenty-five unagglomerated rural nonfarm persons per square mile. The other eight are in relatively large counties. Inspection of small counties with large towns, such as Spalding with Griffin or Clarke with Athens, seems to indicate that a vast majority of the unagglomerated rural nonfarm population is within a seven and a half mile radius of the town. If we assume that eighty-five per cent of the unagglomerated rural nonfarm population of the entire county is within this distance of the town of ten thousand, then all such towns in Georgia, except Americus and Milledgeville, are situated in areas with more than twenty-five unagglomerated rural nonfarm persons per square mile.

It is now apparent that what we tentatively called the unagglomerated rural nonfarm population is actually concentrated, if not unagglomerated, near urban centers. We must conclude, therefore, that the vast majority of rural nonfarm persons living in isolated rural houses are, at very least, "urban oriented"; there is a strong suspicion that they live in agglomerated clusters too loose or too small to meet the rigid specifications of the Census Bureau.

Although these people live outside the urban fringe, they are certainly suburban or at least "semi-urban," and should be considered part of the urban fringe rather than part of the rural population. It might be suggested, however, that the people of the urban fringe are demographically distinct from the people outside, despite their physical proximity. Initial comparison of age, occupational, and industrial structures for the two groups around each of Georgia's five metropolitan areas does not indicate any marked differences. This does appear to be a fruitful avenue for further research to substantiate or disprove the conclusions reached here.

In conclusion, we have seen that at least a third of Georgia's rural nonfarm people live in villages which are presumably more urban than they are rural. The remainder of the rural nonfarm population is largely clustered near urban centers. In short, the rural nonfarm population of Georgia is discontinuously distributed. It does not occupy area, as would be expected of a truly "rural" population; rather, it has the urban quality of occupying points. Those points may be villages, hamlets, or subdivisions outside urban centers. From a cartographic, geographic, or functional point of view, therefore, the rural nonfarm population is more truly urban than rural, and should be considered part of the urban population. It is herewith suggested that "semi-urban" is a much more appropriate term for this population group than is the present "rural nonfarm."

A COMPARISON OF THE THEMATIC APPERCEPTION RESPONSES OF JUVENILE DELINQUENTS AND NON-DELINQUENTS

FLORENE M. YOUNG
University of Georgia

The Thematic Apperception Test by Murray (1943) was administered to 22 boys and 27 girls who had no known record of delinquency, and 34 boys and 34 girls who were in institutions for delinquent youth. On request, the author will furnish more information concerning the subjects than space here permits. The boys ranged in age from 10 to 17 years with a mean age of 14 years. The girls were somewhat older, the mean age being 15 years and the range 11 to 17 years. It is the opinion of the author that the delinquent girls were considerably more disturbed than the delinquent boys, judging from their behavior during the test. This impression was corroborated by the test results.

Each child was given 16 cards, Form B directions being used. All tests were given and scored by the writer.

Both delinquents and non-delinquents are inclined to follow what some writers call "the American pattern" namely, the attributing of a happy ending to an unhappy story. This trend was slightly greater for the delinquents. For the latter subjects the proportion giving both unhappy plots and unhappy endings, 20%, was nearly twice that for non-delinquents.

The test results were analyzed for references to the parents. Only those statements which were clearly indicated were included.

Approximately half of the delinquent girls refer at least once in their 16 stories to the father and/or mother as 'hurt, ill, or dies." For the non-delinquent girls the proportions are 33% and 37%, respectively. Although only 35% of the delinquent boys made such a reference, 21% stated that the father was shot by the son. No delinquent girl mentioned the child as being involved in the shooting.

The non-delinquent boys most often depicted the father as working or earning, 64% having such a designation. In this respect they resemble the delinquent girls, for whom the proportion is 65%. The two groups also are alike in emphasizing the poverty of the father, respective proportions being 36% and 38%.

Non-delinquent boys depict the father as advising the child and this is even more characteristic of the delinquent boys, 38% of whom cast the father in this role in at least one story.

An angry father was portrayed by nearly one-third of the delinquent boys, and this proportion was markedly higher than those for the other three groups. In nearly one-fourth of the instances the child's disobedience to the father was mentioned by the delinquent boys.

The father is described as punitive by nearly one-fourth of the delinquent girls. The same proportion, however, describe him as loving the child.

Non-delinquent boys most often depict the mother as: working and/or earning, 32%; as requiring work of the child, 27%; as the one the child disobeys, 27%; and as caring for the child, 27%.

On the other hand, delinquent boys most often describe the mother as: forgiving the child, 32%; working and/or earning, 29%; requiring work of the child, 29%; punishing the child, 27%; and hunting for the child, 27%.

For non-delinquent girls, the references to the mother were indicative of strained relations: punishing the child, 44%; requiring work with the child, 37%; as 'hurt, ill, or dies," 37%.

Outright hostility is shown by the references of the delinquent girls. The mother is depicted as: punishing the child, 77%; refusing the child's wish, 71%; requiring work of the child, 53%; "hurt, ill, or dies," 50%; and as angry with the child, 47%.

After a careful study of the stories, several characteristics or roles were selected since they appeared to indicate an *unfavorable* attitude on the part of the child toward the parent. These were: "Hurt, ill, dies"; angry with child; punishes child; the parent the child runs from; refuses child's wish.

Nine descriptive terms were selected since they described the parent in a *favorable* light: Advises child; proud of child; gives child gift; fixes toy; fun together; loves child; helps child; forgives; cares for child.

On obtaining a total of the *favorable* descriptions listed above, it was noted that non-delinquent boys clearly indicated a predominance of such attitudes for both parents.

These boys gave favorable comments concerning the father which totalled 168%, while the unfavorable accounted for only 64% of the descriptions. For the mother, this group of boys gave respective proportions of 141% and 73%. The non-delinquent boy portrays his father in a somewhat more friendly role than his mother.

For delinquent boys, favorable traits predominate in describing the father-person, the proportions of favorable and unfavorable being 153% and 97%. For the mother, desirable references also predominate, but the proportions are so similar as to warrant the statement that these delinquent boys appear to be ambivalent toward the mother-person.

The non-delinquent girl pictures the father in a favorable light, the total being 118%, while unfavorable references made up 89%. Toward the mother-person these girls were ambivalent, favorable and unfavorable totals being very similar.

The delinquent girl stresses the unfavorable traits of the father, but the records again warrant the use of the term ambivalent.

Toward the mother-person, the delinquent girls were alarmingly hostile, the unfavorable proportions reaching a total of 271%, with the favorable being only 159%. The mother is depicted by nearly one-third of these girls as locking the child in or out, and according to some of them this treatment has occurred to them personally.

Another factor worthy of mention is the absence of the father from home. This was mentioned by 20% to 25% of the four groups.

Perhaps the regular presence of both parents might have made for more successful guidance of these children.

It should be noted that both groups of girls were approximately a year older than the two groups of boys. Girls generally mature earlier than boys therefore the girls in the present study presumably were considerably nearer maturity than the boys.

SUMMARY

An analysis of the TAT responses to 16 selected pictures, given by four groups of children, reveals the following:

Of the four groups, non-delinquent boys appear to be on the best terms with their parents, these subjects giving emphasis to the favorable traits of both father and mother.

Delinquent boys also stress the favorable attributes of the father, but it should be noted that 21% described the son as having shot the father. Delinquent boys are ambivalent toward the mother-person.

Non-delinquent girls depict the father in a favorable light, but they are ambivalent toward the mother-person.

The delinquent girl is ambivalent toward the father, but she is alarmingly hostile to the mother, emphasizing the unfavorable aspects of her behavior.

Especially for the delinquents, the mother is the more punitive parent, the parent who requires work, study or practice, and the one from whom the child runs away. Since the father is frequently away from home, apparently the mother is more often responsible for the discipline.

REFERENCES

Murray, H. S., 1943. Manual for the Thematic Apperception Test. Cambridge: Harvard Univ. Press.

THE RELATIONSHIP OF GROWTH TO AGE AND SPACING IN SLASH PINE (*PINUS ELLIOTTI*) PLANTATIONS FOR VARIOUS SITE INDICES

EDGAR A. KREIS, JR., and A. E. PATTERSON[1]

Slash pine, which ranges from the southern-most part of the state into the upper coastal plain, has long been the leading species in plantations, due to its fast growth and high naval stores yields. Each year for the past thirty years in the state of Georgia an ever increasing number of acres has been planted with slash pine seedlings. Already, sizeable amounts of saw timber, pulpwood, and naval stores have been harvested from the older plantations. The primary purpose of this study was to help supply part of the technical information needed in order to carry out a progressive management program in slash pine plantations and to serve as a basis for other studies.

1. Forester, Georgia Forestry Commission, and Professor of Forest Management, School of Forestry, University of Georgia, respectively.

The study was made possible through a cooperative endeavor between the University of Georgia School of Forestry, the United States Forest Service, and the Georgia Forestry Commission.

The area in which the study was made lies in the Middle and Upper Coastal Plains of Georgia and was centered around the George Walton Experimental Forest which is ten miles northeast of Cordele, Georgia. It is characterized by fairly level, sandy soils that receive between 46 to 50 inches of rain annually.

In the collection of the data, it was decided that only those plantations in which trees were spaced in feet either 8 x 8, 10 x 10, 15 x 15, or close enough in stems per acre to be classed as such, be sampled. These three spacings were considered to be the more common wider spacings. Spacings closer than 8 x 8 feet were omitted because of the possibility of high mortality due to competition.

The plot size was based on number of trees rather than on ground-area. A total of fifteen trees or the spaces fifteen trees would have occupied in the particular spacing being sampled, were measured. The plot was in the form of three rows of five trees each. Where plantations were large enough and soil conditions varied within the plantation itself, two, three, and sometimes four plots were taken.

The actual tree measurements taken were diameter breast high in inches, dominant height, average height and merchantable height in feet, and age in years.

In order to determine site quality, two soil measurements were made: depth to mottling and depth to fine texture. Depth to mottling is the depth to a zone of poor aeration and drainage, and is characterized by a mottled color in the soil of either red, brown, yellow ,blue, grey, or a combination of any or all. Depth to fine texture is the depth to a zone of high collodial content; in most cases a zone of high clay content. It was determined by the appearance and feel of the soil in the fingers, and not by laboratory methods.

Diameter breast high, dominant height and cubic foot volume were selected for final growth expressions used in computations. In order to establish the relationships of these with age and the two soil measurements each growth expression was run through a multiple or linear regression for each spacing.

From the calculations for dominant height, it may be said that slash pine in plantations, regardless of the spacing, increases in height on the average of about three feet a year up to approximately 25 years of age. Also it may be said that dominant height has no definite or measurable relationship with either depth to fine texture or depth to mottling in the soil.

Until competition shows effect, diameter growth increases at the rate of about 0.84 inches per year. According to the data collected, the points at which competition starts showing its greatest effect for 8 x 8 feet, 10 x 10 feet, and 15 x 15 feet spacing, is respectively 8, 10, and 13 years of age. After competition sets in, diameter growth increases at the rate of 0.23 inches in 8 x 8 feet spacing, 0.25 inches in 10 x 10 foot spacing, and 0.16 inches in a 15 x 15 foot spacing. The smaller increase in diameter in the 15 x 15 foot spacing after

competition sets in is probably due to the higher average age of the plots taken in the 15 x 15 foot spacing. In the older plots, the natural slowing of growth is more likely to be encountered. After competition sets in, diameter increases as spacing increases. Diameter failed to show any correlation with either of the soil measurements.

Rate of volume of growth and total volume increases as spacing decreases due to the larger number of stems per acre in the closer spacings. Volume increases annually at the rate of 3.9 cords in 8 x 8 foot spacings, 3.3 cords in 10 x 10 foot spacings, and 2.0 cords in 15 x 15 foot spacings. These volumes were based on a 100 percent survival.

Depth to mottling affects volume in the following manner. For every increase of 10 inches in depth to mottling, up to 60 inches, in 8 x 8 foot and 10 x 10 foot spacings, volume increases 1.7 and 1.6 cords respectively. In a 15 x 15 foot spacing, volume decreases 0.5 cords for every increase of 10 inches of depth of mottling, up to 60 inches. In increase in volume with the increase in depth to mottling in the closer spacings, 8 x 8 feet and 10 x 10 feet, and the decrease in volume with the increase in depth to mottling in the 15 x 15 foot spacing can possibly be attributed to available soil moisture which is one of the limiting factors in tree growth. Mottling, which is a zone of poor aeration and drainage, represents a more or less important zone and usually retards root growth, but at the same time is a zone of high water holding capacity. In the 8 x 8 foot and 10 x 10 foot spacings, where root competition between trees for soil moisture takes place at an early age, more moisture can be gained in the deeper soils due to the greater volume of soil than in the shallower soils even though the concentration of soil moisture is higher; while in the 15 x 15 foot spacing, where competition sets in at an older age, the higher soil moisture content in the shallower soils causes a higher rate of growth than the deeper soils with their low soil moisture concentration. What actually happens, in all probability, although means of proving it are not available, is that where competition is almost absent, the shallower soils are more favorable and as competition increases the deeper soils become more favorable, although the effect of the depth is more pronounced when competition is increased.

MISSISSIPPIAN REEF STRUCTURES IN NORTHWEST GEORGIA

VAUX OWEN, JR.
Emory University

The purpose of this study of Upper Mississippian reef horizons in the Lookout Mountain area of Northwest Georgia is to ascertain whether these horizons are bioclastic or whether they represent preserved reefs with an ecological fossil assemblage, the constituents of which could be regarded as coexistent within a definite period of time.

The outcrops were observed in the field and samples were studied microscopically in the laboratory. Slides and polished sections were used. It was found that the polished sections were more useful when etched with hydrochloric acid.

A section of reef occurs along Georgia Highway 143 on the west side of Lookout Mountain. The exposed section is about 20 feet in length, being obscured at both ends by talus; thickness is about 4 feet (Fig. 1). Corals of a colonial lithostrotian type make the

FIGURE 1. *Reef structure in Mississippian limestone, northwest Georgia; the four-foot sledge hammer handle measures the thickness of the reef between horizontal limestone layers.*

zone very conspicuous. Having been partially replaced by silica they have resisted erosion and give a knobby appearance to the enclosing limestone. Though conspicuous, the corals form only a small proportion of the horizon. They occur in branching colonies 1 to 2 feet in thickness and with a maximum vertical dimension of about 18 inches. Distance between colonies varies but is commonly 4 to 5 feet. Most of the colonies are in essentially a vertical position with respect to bedding but some are in an almost horizontal position. The latter are not broken but are greatly flattened parallel to the vertical axes. The intervening limestone is a light to medium gray calcilutite. The horizon is underlain by a dense, dark, somewhat shaly calcilutite in which fossils are very sparse and which is overlain by a moderately fossiliferous, medium gray calcilutite.

Samples of the coral colonies and of the intervening limestone were taken. Use was also made of samples collected by other workers from outcrops in the same area. Slides and polished sections were prepared and 3 distinct textures were observed

(1) *Oolitic.* This texture was found to be prevalent outside the coral colonies themselves but within the same horizon. The oolites

are small and densely packed, being built up around minute grains of silica, calcite rhombs, and other less clearly defined characters.

2. *Corals with interstitial lime mud.* This was found to be a common texture within some of the samples taken from the coral colonies themselves. Here the only fossils found are the corals; all the rest of the space is occupied by a very fine-grained, dense groundmass of limestone.

(3) *Corals with much interstitial fossil material.* In samples from some of the coral colonies practically all the interstitial space is occupied by minute fossils. The dominant type appears to be a calcareous alga similar to the genus "Mizzia" described by Johnson (1942) in a paper on Permian reefs of the Guadalupe Mountains of New Mexico. These algae appear in polished sections as long, bead-like strings. In thin sections these beads may be seen to be connected by narrow necks. The walls of the individual beads possess a porous structure similar to that of a sponge but on a much smaller scale. According to Johnson this genus has been found previously only in the Permian of North America. While the identification made in this investigation is tentative, the specimens observed appear to fit Johnson's description and photomicrographs. There are many foraminifera tests in some of the samples as well as bryozoa, crinoid stems, and crinoid arms. The fossils are all well-preserved and unfragmented. No fragments of large fossils were observed.

Replacement of fossils by silica is limited to the large coral forms and these are nowhere entirely replaced. The individual corallae have numerous dissepiments, arranged between the septa, which slope at an angle toward the centers of the corallae. This internal structure evidently controlled the downward percolation of siliceous solutions which progressed downward and inward beginning with the periferal edges around the tops of the calyces. The porous condition of the corallae after the death of the coral animals probably provided the conditions necessary for the penetration by the solutions. Secondary recrystallization of calcite accompanied the silica replacement and is intimately associated with it. The effect has been to destroy all porosity which might exist. There has also been some limited dolomitization within the corallae and this is attributed to the same solutions which caused silification and recrystallization of calcite. Secondary silica and calcite may be found in the dissepiments as well as in the interstitial spaces but dolomitization appears to be limited to the dissepiments.

The replacement and dolomitization appear to have occurred after compaction of the limestone because the interstitial material between the corallae probably presented an impenetrable barrier to the solutions. Many of the large foraminifera tests appear at first glance to be replaced by silica but treatment with acid and hardness tests indicate that they are calcite.

Insoluble residue tests showed practically all the insoluble material to be silica with a subordinate amount of very fine, argillaceous mud. A very small amount of mica was also found.

It is concluded that the samples observed represent a reef hori-

zon which has undergone but little deformation thus its ecology is substantially preserved. The deformation that has occurred apparently took place after solidification of the rock under conditions of plastic flow. Bending toward the horizontal and lateral flattening of some of the colonies indicate the response of an already solid body to pressure. The samples with corals and much interstitial fossil material are believed to represent the growing part of the reef. Here there was apparently very little agitation of the water, consequently but little oolitic formation and the smaller forms such as calcareous algae and foraminifera were able to survive. The samples with corals and interstitial lime mud with no small fossils are believed to represent small basinal areas within the reef in which the calcareous mud settled too rapidly to permit the survival of small life forms. The oolitic samples are from zones between the coral colonies and are believed to represent surge channels cutting into the reef through which mild, shallow currents flowed and favored the formation of oolites. The completely unfragmented condition of the small fossils, the intact condition of the coral colonies, absence of large fragments and the typical associations of such forms as calcareous algae support the idea that the present textural and fossiliferous constituents of the horizon preserve the biohermal environment at the time of formation. The horizon probably should not be regarded as a coral reef but rather as a reef on which corals grew. The corals extend vertically only a few feet and are not in themselves responsible for the existence of the reef.

ACADEMY AFFAIRS

THE PRESIDENT'S PAGE

It is hoped and expected that the current year will see an extension of the growth and improvement that the Academy has been experiencing in the past years. If that is to be the case it will demand the cooperation and the counsel of all the members. The purpose of this letter is to report some of the plans and suggestions which have been brought to the minds of the officers and members of the Council in order to stimulate thought and comments upon the part of the members of the Academy.

First in order of time is the relationship of the Academy to the AAAS meeting in Atlanta, December 26-30. We have been asked to be host to the Academy Conference section and we have accepted that responsibility. This will involve primarily setting up a hospitality area near the registration desk in the Municipal Auditorium. Plans for the physical arrangements are well under way. We will need, however, volunteers to man the area during appropriate hours of the meeting period. Indications of your willingness in this matter will be welcomed by the Secretary or myself.

Suggestions have come to the Council about ways in which the Academy can improve its services. We hope to enlarge the Bulletin;

this will mean consideration of ways of financing a larger publication. We are seeking ways in which the Academy can do more to stimulate interest in science among high-school students; we hope to extend the coverage of the Junior Academy of Science as part of that endeavor. There are no doubt many ways in which the annual meetings of the Academy can be made less competitive with meetings related to special disciplines of science. There are many people engaged in scientific vocations within the state who have not been brought into the work of the Academy; all of these should be encouraged to join. These are areas with which the Academy Improvement Committee and other committees of the Academy are concerned at present. Your suggestions will be welcomed by the Council or by the relevant committee. Please let us know what your ideas are on these matters.

A word of explanation is needed concerning the "disappearance" of the offer of awards for excellence for papers presented at the last Academy meeting. So few papers were submitted by the sections for consideration that it was decided more appropriate to publish all of those papers, wherever the author was willing, in the Bulletin, rather than attempt to pick from among the very few papers submitted. This time we must simply declare "No Contest" and try to think the matter through again.

Sincerely yours,
GEORGE C. SEWARD

THE SECRETARY'S PAGE

The executive council met on October 14, 1955 with all members present except four.

Although actions taken will reach the members concerned through the proper channels, it seems appropriate to bring certain of the transactions to the attention of the membership at large.

A special effort is to be made to encourage greater participation in the annual meetings by college and graduate students in our state. It is hoped that members of the Academy will direct the efforts of students so as to culminate in the presentation of papers next spring.

The council passed unanimously a motion by Dr. Simms to permit a meeting of college chemistry students (and groups in other areas of study if they so request) to be held in conjunction with the annual meeting. A very successful statewide assembly of chemistry students was held in Athens on Saturday morning of the meeting last spring, and it is hoped that this performance will be repeated this year and that other groups may see fit to call for similar meetings.

The council went on record in favor of having the present and all future secretaries of each of the sections serve also as the chairman-elect of the section. This procedure should not only insure greater continuity of management within each section but also should afford greater recognition to the role of secretary of the section.

MARION T. CLARK, *Secretary*

THE ACADEMY AWARD FOR THE MOST OUTSTANDING PAPER

Due to several factors, one of which was the small number of papers presented for judging, the committee decided not to designate a *winner* following the meeting at Athens. The award program will be better organized and more widely publicized for the coming year and it is anticipated that each section will participate by designating its best paper.

It was suggested that the three papers submitted be published in the Bulletin, however, the authors of two of the papers preferred to publish their papers in more technical journals. The other paper is published in this issue of the Bulletin. The authors and titles of the three papers presented as being the most outstanding from the respective sections are listed below.

Seldon D. Feurt and Joseph P. LaRocca, Section I. Apparatus for evaluating analeptic or sedative compounds in mice.

William H. Jones, Section II. A rapid ion exchange separation with simple equipment.

John Fraser Hart, Section III. The distribution of the rural nonfarm population in Georgia.